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## SOME OBSERVATIONS ON THE HABITS OF PECTEN DISLOCATUS.

B. H. GRAVE.

With the purpose of studying the habits of the scallop, *Pecten dislocatus*, I collected many young specimens ranging from two to ten millimeters in length and placed them in small glass aquaria in the laboratory.<sup>1</sup> They were found in the harbor at Beaufort, N. C., well above the muddy bottom, clinging to eel grass. They were usually attached by several strands of hyaline byssal threads, which were exceedingly strong and elastic.

Although the *Pecten* is so generally known as to make a detailed description of its anatomy superfluous, yet a brief description of certain parts is deemed necessary. For a more detailed study of the anatomy, reference can be made to a paper, by G. A. Drew, on "The Habits and Anatomy of the Giant Scallop."

By reference to Figs. 1 and 2, it may be seen that the shell is rounded and eared. The ears make possible the long, straight hinge line, which extends along their upper borders to their extremities. The right valve is slightly more convex than the left, and near the anterior<sup>2</sup> ear, it has a deep notch. This one feature mars the symmetry of the valves. Between the valves and just beneath the hinge ligament, there is a pad of cartilage-like substance, which is compressed when the valves are closed. It serves to open them quickly when the adductor relaxes (Fig. 3).

The form of the shell and the structure and arrangement of the soft parts within, adapt *Pecten* to the swimming habit. It swims by opening and closing the valves in rapid succession. By varying the position of the mantle so as to control the direction of

<sup>1</sup> Through the courtesy of Hon. Geo. M. Bowers, U. S. Commissioner of Fish and Fisheries, I had the privilege of occupying a table in the Fisheries Laboratory, at Beaufort, N. C., for two months during the summer of 1908. For this privilege and for many kindnesses shown me by the Director, Henry D. Aller, I am glad to express appreciation.

<sup>2</sup> The hinge line is here considered dorsal for convenience in description, although it does not represent the true dorsal of the animal.

the currents of water expelled from the mantle chamber, it is enabled to swim either forwards or backwards, although it usually swims with the opening of the valves directed forwards.

A perfectly symmetrical shell is the form best adapted to swimming, and the presence of any irregularity in it, such as that just mentioned in the pecten, is to be explained either as an adaptation to habits other than swimming, or as a structure, inherited from an ancestral form, and not as yet obliterated through adaptation to the swimming habit.

Although adult specimens were kept in aquaria all summer, no method of locomotion other than swimming was noted, and no clue was gained as to habits which would in any way explain the function of the notch in the right valve. They neither attached themselves by a byssus, nor used the foot for locomotion. Young specimens, however, showed much more activity than the adults, and some observations on their habits are recorded in the following pages.

Concerning the function of the notch in a related species, *Pecten tenuicostatus*, Dr. Drew writes as follows: "I have been unable to satisfy myself as to the function performed by this notch. The sense tentacles on the mantle margin, opposite the notch, are somewhat longer than those adjacent, but I have been unable to determine that they have a special function or that they are especially advantageously placed."<sup>1</sup>

#### THE SENSE OF POSITION.

The *Pecten* lies habitually upon the right valve and if placed upon the left, immediately turns over. When lying upon the left valve, it seems to feel the same sort of discomfort which a frog, or other animal with well developed balancing organs, feels when placed upon its back. However, after turning them over repeatedly, they sometimes remained resting on the left valve for several minutes.

#### THE ASYMMETRY OF THE VALVES.

When dropped through a considerable depth of water, *Pectens* settle about as frequently upon the left valve as upon the right.

The slight flatness of the left valve does not serve to make them settle always upon the same side.

#### THE FUNCTIONS OF THE FOOT.

The foot lies just opposite the notch in the right valve. It appears to be functionless in adult specimens, or rarely used by them, but is made use of to good advantage by the young. Specimens were often seen to extend the foot anteriorly to a remarkable distance, attach it at the tip to the bottom and then, by a powerful contraction, draw the body forwards to the point of attachment. The foot is cylindrical and seems very small to carry such a load; and frequently, after it has been extended and attached, the valves are opened and clapped together, at the same time the foot contracts, the body thus being drawn forward with much less strain upon that organ. This method of locomotion is a combination of swimming and creeping. The force of the current of water expelled from the mantle chamber serves to raise the body and propel it forwards as far as the attached foot will permit. At the same time, the foot contracts and the body lands close to the point of attachment. When this method of locomotion is used, the foot, instead of being extended directly outwards, anteriorly, is usually directed more ventrally, so that the point of attachment is more nearly in line with the force exerted by the swimming movement. Except for the notch in the right valve, this sort of performance would not be possible, because by the closure of the valves, the foot would be crushed.

The foot is, also, frequently used in turning the body over, when placed upon the left valve; it is extended anteriorly from the body and attached; the valves are opened and clapped together vigorously; the body, as a result, is raised and shot forwards, but the weight of the foot and the resisting pull from its attachment cause it to swing over upon the foot as a pivot, the scallop landing upon the other valve, having turned through an arc of 180 degrees.

The above method of turning over, is usually, if not quite universally, used by specimens when placed upon the left side for the first time. After a little handling, however, they become much more irritable, seeming to be excited, and at such times, they

manage to right themselves by one of three methods : Sometimes without extending the foot, they open the valves and clap them together. After one or several trials, the body turns over upon the hinge line as a pivot. The mantle must have played a part in this by expelling currents of water in a direction such as to cause the body to turn over.

At other times, a position on the right valve is gained by one or more short swims, the method being continued until the body comes to rest on the right side. They usually manage to alight upon the right valve after a few trials, and then they become quiet.

#### THE BYSSUS.

When specimens are allowed to lie undisturbed upon the right valve, they usually become attached by numerous strands of strong byssal threads. A short time only is required for this to take place. They frequently become firmly fixed in from two to five minutes and the threads are sufficiently strong to support a weight several times that of the body of the *Pecten*. The byssal threads pass through the notch in the right valve directly to the support below. They adhere, to some extent, to the shell where they come into contact with it.

So long as specimens are kept lying upon the left valve, they cannot, or do not, attach themselves by the byssus. Since the byssal gland lies at the base of the foot, it is possible that the notch, in the shell opposite it, is a structural adaptation directly correlated with the function of the byssus. At any rate, because the byssal threads extend through the notch, in place of over the edge of the shell, the pull has less tendency to tilt the body than would be the case if no notch were present.

In order for the byssus to become attached to the bottom, it is not necessary for the valves of the shell to be opened, since the attachment of the byssus is frequently accomplished while they are closed. The notch in the shell is sufficiently large to allow the extension of the foot to the support during the process of attaching the byssus. It seems that Dr. Drew has observed this process in individuals of *Pecten irradians*, to quote :

“An individual of *Pecten irradians* placed in a glass dish of sea water will sometimes protrude its foot from the shell, apply it

closely to the bottom of the dish and after a short time, slowly withdraw it, leaving a rather broad band of slightly yellowish material attached to the glass and connected with the foot by the byssal gland. This is not composed of small threads as in the mussels *mytilus* and *modiola*, but it may be sufficiently tough to support the weight of the animal, if, after a few minutes, the dish is carefully turned over."<sup>1</sup>

#### SUMMARY.

By way of summary, therefore, it might be said concerning the function of the notch that it makes possible a much freer use of the foot and byssal gland, and is in some way connected with the function of these organs. Although many mollusks live in the mud, the fact that young *Pectens* do not is evidence that they do better out of it. The foot and byssus enable them to climb upon supports and maintain their position there. As they approach maturity, they assume more and more the swimming habit and the foot and byssus lose, to some extent or entirely, their functional activity. If these organs are not functional in full-grown *Pectens*, as seem probable, the notch is no longer of any value to them, although it is not obliterated.

The *Pecten* has the sense of position well developed.

EARLHAM COLLEGE, RICHMOND, INDIANA,

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<sup>1</sup> *The University of Maine Studies*, No. 6, September, 1906, p. 18.

## EXPLANATION OF PLATE I.

FIG. 1. Shows the left valve as it appears from surface view. It is not quite symmetrical.

FIG. 2. Shows the right valve as it appears from surface view. The prominent notch at the base of the anterior ear can be seen.

FIG. 3. Is a view of the inner surface of the right valve. The dotted line shows the position of the cartilage pad which aids in opening the valves.

